

USGS NSF GRIP Opportunity

● USGS Center:	Illinois Water Science Center
● Project Title:	Historical assessment of recruitment of Grass carp in the Sandusky River
● Project Hypothesis or Objectives:	<p>Grass Carp, a species of invasive Asian Carp, have successfully reproduced in the Sandusky River (Ohio), a tributary of Lake Erie, with 1-year-old and 2-year old fish captured in 2012 and 2015, respectively. Assessing the aquatic conditions that determine the success or failure of reproduction is useful in controlling the early life stages of Asian Carp in Great Lakes tributaries.</p> <p>Fluvial Drift Simulator (FluEgg) is a three-dimensional Lagrangian numerical model developed to track how eggs and larvae drift in riverine habitats. The FluEgg model, developed by University of Illinois in collaboration with U.S. Geological Survey, was developed primarily as a tributary assessment tool to study the transport and dispersal patterns of Asian carp eggs in tributaries of the Great Lakes. The model incorporates information about Asian carp egg development, water temperature and river hydraulic conditions to provide insights regarding the likelihood of a river to transport Asian carp eggs in suspension until hatching and larvae until reaching the gas bladder stage. Asian Carp reproduction success was evaluated previously in the Saint Joseph River, Illinois River and Sandusky River (preliminary assessment). With the recent capture of Grass Carp young fish, there is additional certainty of Grass Carp reproduction in the Lower Sandusky River below Ballville Dam. The transport of eggs and larvae at different flow events and water temperatures need to be simulated to cross-correlate the capture of young fish (recruitment success) with the historical hydraulic and water quality conditions of the Sandusky River.</p> <p>Potential spawning events will be analyzed using FluEgg together with an unsteady hydraulic model. Historical events from 2011 to 2015 will be evaluated for recruitment success or failure. The goal of this project is to evaluate the conditions that can lead to Grass Carp recruitment success or failure in the Sandusky River using historical information of captured Grass carp and FluEgg simulations coupled with an unsteady hydraulic model.</p>

● Duration:	12 months
● Internship Location:	Urbana, Illinois
● Area of Discipline:	Eco-hydrology, Hydrology, Hydraulics, Ecology, Fisheries
● Expected Outcome:	This is a unique opportunity to work on a research project that has gained national attention. The intern will work directly with the developer of the FluEgg model. The principal outcome of this research project is to publish a peer reviewed manuscript in a respected and reputable scientific journal.
● Special skills/training Required:	<ul style="list-style-type: none"> • Background in the eco-hydrology field. • Familiar with steady and unsteady hydraulic modelling. • Knowledge in MATLAB programming is a plus.
● Duties/Responsibilities:	<p>Listed below are the duties and responsibilities assigned to the intern. This is an interdisciplinary project. As such, the intern may select one or two research tasks depending his or her area of interest.</p> <ul style="list-style-type: none"> • Gather and analyze historical data and determine representative events for describing hydrodynamic and water temperature conditions in Lower Sandusky River during spawning season. • Investigate hydrodynamic and water temperature boundary conditions for Hec-Ras modeling of the Sandusky River. Perform unsteady Hec-Ras simulations of the lower Sandusky River by converting an existing steady-state Hec-Ras model. Validate and/or calibrate the model with sampled hydraulic data collected by USGS in 2013. • Prepare FluEgg River input files describing hydrodynamic and water temperature conditions of Sandusky River. • Synthesize Grass Carp recruitment success or failure in the Lower Sandusky River by cross-correlating FluEgg simulation results, hydrodynamic and water temperature conditions, and the location of potential nursery habitat in the lower Sandusky River. • Participate in the preparation of a peer-reviewed journal manuscript compiling findings of the project with opportunity to be listed as author or coauthor.
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